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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/591,093

08/29/2006

Jiro Kondo

52433/861

7884

26646 7590 07/28/2008

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EXAMINER

COHEN, STEFANIE J

ART UNIT

PAPER NUMBER

4162

MAIL DATE

DELIVERY MODE

07/28/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/591,093	Applicant(s) KONDO ET AL.	
	Examiner STEFANIE COHEN	Art Unit 4162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/29/2006; 10/20/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fujiwara et al. (20050139148). Fujiwara teaches a method for removing boron from silicon where a slag material comprises silicon oxide (SiO_2) and calcium oxide powder (CaO).

Fujiwara, paragraphs 42 and 43 of the PGPUB, further teaches to reduce the melting point or viscosity without damaging the effect of the slag serving as an oxidizer, calcium oxide is entirely replaced by sodium oxide (Na_2O). When adding Na_2O , it is preferable to use Na_2CO_3 . Fujiwara, ex. 1, teaches blending raw silicon having a boron concentration with the slag material in a crucible and melting the blend to a temperature of 1550°C but does not teach melting the blend at a higher temperature. It would have been obvious to one of ordinary skill in the art at the time of the invention that the melting temperature of the blend would increase or decrease depending on the impurities in the silicon and the slag materials, and it would have been obvious to raise the temperature to the level where melting is performed.

Regarding claim 2, Fujiwara, paragraph 45 of the PGPUB, teaches after treating the blend, the blend is stood still for several minutes for sufficiently separating the molten

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silicon and the molten slag from each other and the molten silicon is taken out by about several grams so that no molten slag is mixed thereinto.

Regarding claims 3, 5-6, 9, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the interval time to obtain the purist form of silicon.

Regarding claim 4, Fujiwara teaches Fujiwara, ex. 1, teaches blending raw silicon having a boron concentration with the slag material in a crucible. The slag material comprises both the silicon oxide and Na_2CO_3 ; therefore silicon oxide and Na_2CO_3 are simultaneously added to the silicon having a boron concentration.

Regarding claims 5 and 7, it would have been obvious to one of ordinary skill in the art at the time of the invention that the order of the addition of the slag materials would have no impact on the final silicon product as long as all the components are well mixed.

Regarding claims 8 and 10, it would have been obvious to one of ordinary skill in the art at the time of the invention to discharge already formed slag as many times as needed to obtain additional space for further treatment of the raw silicon having a boron concentration.

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Regarding claim 11, Fujiwara, ex. 1, teaches the boron content after the treatment was .8 ppm.

Regarding claim 12, it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize the addition of slag to obtain the purist form of silicon.

Regarding claim 13, Fujiwara, ex. 1, teaches slag having a weight ratio of 65:35 of silicon oxide to calcium oxide or Na_2CO_3 . Having a 1 kg mixture of slag comprising Na_2CO_3 and SiO_2 and raw silicon having a boron concentration mixed in a 1:4 ratio leads to around a mol ratio around 5 of moles of silicon in the silicon dioxide to moles of the alkali element.

Regarding claim 16, Fujiwara, paragraph 41 of the PG PUB, teaches an additive is generally employed to attain various objects such as an adjustment of the viscosity.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to STEFANIE COHEN whose telephone number is (571)270-5836. The examiner can normally be reached on Monday through Thursday 8:00am-4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jenny McNeil can be reached on 5712721540. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Stefanie Cohen

SC

/Jennifer McNeil/
Supervisory Patent Examiner, Art Unit 4162